

High-strength structural bolting assemblies for preloading —

Part 1: General requirements

The European Standard EN 14399-1:2005 has the status of a British Standard

ICS 21.060.01

National foreword

This British Standard is the official English language version of EN 14399-1:2005.

EN 14399-1:2005 is a candidate “harmonized” European Standard and fully takes into account the requirements of the European Commission mandate M/120, *Structural metallic products and ancillaries*, given under the EU Construction Products Directive (89/106/EEC), and is intended to lead to CE marking. The date of applicability of EN 14399-1:2005 as a harmonized European Standard, i.e. the date after which this standard may be used for CE marking purposes, is subject to an announcement in the *Official Journal of the European Communities*.

The Commission in consultation with Member States has agreed a transition period for the co-existence of harmonized European Standards and their corresponding national standard(s). It is intended that this period will comprise a period, usually nine months, after the date of availability of the European Standard, during which any required changes to national regulations are to be made, followed by a further period, usually of 12 months, for the implementation of CE marking. In this instance an application has been made to CEN for a two-year extended co-existence period, from September 2005 to September 2007¹⁾. At the end of the co-existence period, the national standard(s) will be declared obsolescent, and will be withdrawn on publication of Eurocode 3.

EN 14399-1:2005 is the subject of transitional arrangements agreed under the Commission mandate. In the UK, the corresponding national standards are:

- BS 4395-1:1969, *Specification for high strength friction grip bolts and associated nuts and washers for structural engineering — Part 1: General grade*;
- BS 4395-2:1969, *Specification for high strength friction grip bolts and associated nuts and washers for structural engineering — Part 2: Higher grade bolts and nuts and general trade washers*²⁾;

and based on the applied-for transition period, it is planned that BS 4395-1:1969 and BS 4395-2:1969 will be declared obsolescent in September 2007¹⁾, and then, together with BS 449 and BS 5950, will be withdrawn upon publication of Eurocode 3.

BS 4395-1:1969 and BS 4395-2:1969 currently support BS 449 and BS 5950.

NOTE This date is approximate. Users of this standard should contact BSI Customer Services for confirmation of withdrawal.

¹⁾ CEN/TC 185/WG 6 has applied for a two-year extended co-existence period, to “September 2007”, and for a corrigendum to amend the second “September 2005” date in the Foreword to EN 14399-1:2005 to “September 2007”.

²⁾ Together with BS EN 14399-2:2005, BS EN 14399-3:2005, BS EN 14399-4:2005, BS EN 14399-5:2005 and BS EN 14399-6:2005, BS EN 14399-1:2005 supersedes BS 4395-1:1969 and BS 4395-2:1969.

Summary of pages

This document comprises a front cover, page i, a blank page, an inside front cover, the EN title page, pages 2 to 22, an inside back cover and a back cover.

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The UK participation in the preparation of EN 14399-1 was entrusted by Technical Committee FME/9, Nuts, bolts and accessories/Steering Committee, to its Subcommittee, FME/9/1, Materials, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Additional Information

This part of BS EN 14399 is one of several parts that comprise the BS EN 14399 series of standards. BS EN 14399-1 provides the general requirements to which the other parts, which provide specific requirements regarding manufacture, materials and testing, relate.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

English version

High-strength structural bolting assemblies for preloading - Part 1: General requirements

Boulonnerie de construction métallique à haute résistance
apte à la précontrainte - Partie 1: Exigences générales

Garnituren für hochfeste planmäßig vorspannbare
Schraubenverbindungen für den Metallbau - Teil 1:
Allgemeine Anforderungen

This European Standard was approved by CEN on 3 February 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This document (EN 14399-1:2005) has been prepared by Technical Committee CEN/TC 185, "Threaded and non-threaded mechanical fasteners and accessories", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2005, and conflicting national standards shall be withdrawn at the latest by September 2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This document includes a Bibliography

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This document on structural bolting reflects the situation in Europe where two technical solutions exist to achieve the necessary ductility of bolt/nut/washer assemblies. These solutions utilize different systems (HR and HV) of bolt/nut/washer assemblies, see Table 1. Both systems are well proved and it is up to the experts responsible for structural bolting whether they use the one or the other system.

It is, however, important for the performance of the assembly to avoid mixing up the components of both systems. Therefore, the bolts and nuts for both systems are standardized in one single part of this European Standard each and the marking of the components of the same system is uniform.

Table 1 — Systems of bolt/nut/washer assemblies

	Bolt/nut/washer assembly System HR		Bolt/nut/washer assembly System HV
General require- ments	EN 14399-1		
Bolt/nut assembly	EN 14399-3		EN 14399-4
Marking	HR		HV
Property classes	8.8/8	10.9/10	10.9/10
Washer(s)	EN 14399-5 or EN 14399-6		EN 14399-5 or EN 14399-6
Marking	H		H
Suitability test for preloading	EN 14399-2		EN 14399-2

Preloaded bolted assemblies are very sensitive to differences in manufacture and lubrication. Therefore it is important that the assembly is supplied by one manufacturer who is always responsible for the function of the assembly.

For the same reason it is important that coating of the assembly is under the control of one manufacturer.

Beside the mechanical properties of the components the functionality of the assembly requires that the specified preload can be achieved if the assembly is tightened with a suitable procedure. For this purpose a test method for the suitability of the components for preloading was created which will demonstrate whether the function of the assembly is fulfilled.

For the time being, the product standards EN 14399-3 to EN 14399-6 are the only European Standards which have regard to the general requirements of EN 14399-1. However, further product standards on

- fit bolts,
- countersunk head bolts, and
- load indicating washers

for the use in high strength structural bolting for preloading are under preparation.

1 Scope

This document specifies the general requirements for the components of bolt/nut/washer(s) assemblies for high-strength structural bolting, which are suitable for preloading, and for the assemblies themselves.

Examples for components which fulfil the requirements of this document are specified in EN 14399-3, EN 14399-4, EN 14399-5 and EN 14399-6.

NOTE For clauses of this document addressing the provisions of the EU Construction Products Directive, see Annex ZA.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ENV 1090-1:1996, *Execution of steel structures — Part 1: General rules and rules for buildings*.

EN 10045-1, *Metallic materials — Charpy impact test — Part 1: Test method*.

EN 10204, *Metallic products — Types of inspection documents*.

EN 14399-2, *High-strength structural bolting for preloading — Part 2: Suitability test for preloading*.

EN 14399-3, *High-strength structural bolting for preloading — Part 3: System HR — Hexagon bolt and nut assemblies*.

EN 14399-4, *High-strength structural bolting for preloading — Part 4: System HV — Hexagon bolt and nut assemblies*.

EN 14399-5, *High-strength structural bolting for preloading — Part 5: Plain washers*.

EN 14399-6, *High-strength structural bolting for preloading — Part 6: Plain chamfered washers*.

EN 20225, *Fasteners — Bolts, screws, studs and nuts — Symbols and designation of dimensions (ISO 225:1983)*.

EN 20898-2, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread (ISO 898-2:1992)*.

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs (ISO 898-1:1999)*.

EN ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method (ISO 6507-1:1997)*.

EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2000)*.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in *Guide to the Implementation of Directives Based on the New Approach and Global Approach* and ENV 1090-1:1996 and the following apply.

3.1

assembly

comprises matching bolt, nut and necessary washer(s)